King Abdulaziz University		**Final Exam – Math110**
Faculty of Science and Arts – Rabigh		**Date: 10 / 8 / 1437**
Department of Mathematics		**Time: 120 minutes**

Name: …….. **ID:** …… **A**

Choose the correct answer of the following questions:

(1) If $5^{(x+2)} = 125$, then $x =$

(A) 1 (B) 2 (C) -2 (D) -1

(2) The radian measure of 25° is

(A) $\frac{5\pi}{36}$ (B) $\frac{\pi}{36}$ (C) $\frac{5\pi}{6}$ (D) $\frac{\pi}{6}$

(3) The function $f(x) = 6 + 5x^2 - x^4$ is

(A) even (B) odd

(C) neither even nor odd (D) even and odd

(4) If $y = x^{3x}$ then $y' =$

(A) $x^{3x}(3+3\ln x)$ (B) x^{-3x}

(C) $x^{-3x}\ln x$ (D) $3x^{-3x}\ln x$

(5) If $y = 3x^2 - 2x + 1$, then $y' =$

(A) $6x - 6$ (B) 6 (C) $6x^2 - 2$ (D) $6x - 2$.

(6) If $x^3 + y^3 = 18xy$, then $y' =$

(A) $\frac{6y + x^2}{y^2 + 6x}$ (B) $\frac{6y + x^2}{y^2 - 6x}$ (C) $\frac{6y - x^2}{y^2 - 6x}$ (D) $\frac{x^2 - 6x}{6x - y^2}$

(7) If $y = \frac{x^2 + 4x + 3}{2x + 1}$, then $y' =$

(A) $\frac{(2x+1) - (x^2 + 4x + 3)}{(3x - 2)^2}$ (B) $\frac{(2x+4)(2x+1) - 2(x^2+4x+3)}{(2x+1)^2}$

(C) $\frac{(2x+4)-2}{(3x-2)^2}$ (D) $\frac{(2x-4)+2}{(3x+2)}$

(8) The domain of the function $y=3^x$ is

(a) $[3,\infty)$ (b) $(0,\infty)$ (c) $(3,\infty)$ (d) $(-\infty,\infty)$

(9) If $y=\cos^{-1}(x-2)$, then $y'=$

(A) $\frac{1}{\sqrt{1-(x-2)}}$ (B) $\frac{-1}{\sqrt{1-(x-2)^2}}$

(C) $\frac{-1}{\sqrt{1+(x+2)^2}}$ (D) $\frac{-1}{\sqrt{1-(x-2)^4}}$

(10) If $y=e^{\sec 3x}$, then $y'=$

(A) $e^{\sec 3x}\sec 3x$ (B) $3e^{\sec 3x}\sec 3x\tan 3x$

(C) $3e^{\sec 3x}\tan 3x$ (D) $3e^{\sec 3x}\tan^2 3x$

(11) If $y=3^{\tan x}$, then $y'=$

(A) $3^{\tan x}\sec x$ (B) $3^{\tan x}\sec^2 x$ (C) $3^{\tan x}\sec^2 x\ln 3$ (D) $3^{\tan x}$

(12) The vertical asymptote of $f(x)=\frac{3x}{2x-1}$ is

(A) $x=\frac{1}{3}$ (B) $x=\frac{3}{2}$ (C) $x=\frac{1}{2}$ (D) $x=\frac{2}{3}$

(13) $\cos^{-1}\left(\frac{1}{2}\right)=$

(A) $\frac{\pi}{3}$ (B) $-\frac{\pi}{3}$ (C) $-\frac{\pi}{6}$ (D) $\frac{\pi}{6}$

(14) If $f(x)=\sqrt{x+1}$ and $g(x)=x^2+1$ then $g\circ f$ is

(A) $(g\circ f)(x)=x$ (B) $(g\circ f)(x)=x-1$

(C) $(g\circ f)(x)=x-2$ (D) $(g\circ f)(x)=x+2$

(15) The function $f(x)=\frac{x+1}{x+3}$ is discontinuous at $x=$

(A) 3 (B) 0 (C) -3 , 3 (D) -3

(16) $\log_2 16 =$

(A) 10 (B) 8 (C) 9 (D) 4

(17) The function $g(x) = 3x^2 - x^6 + 4$ is classified as

(A) rational (B) algebraic

(C) polynomial (D) power

(18) If $y = \log_2(x^2 - 5)$, then $y' =$

(A) $\frac{2x}{(x^2+5)}$ (B) $\frac{x}{(x^2-5)\ln 2}$ (C) $\frac{1}{(x^2-5)}$ (D) $\frac{2x}{(x^2-5)\ln 2}$

(19) If the function f defined by $f(x) = \begin{cases} x-4 & if \quad x \le 2 \\ x^2 & if \quad x > 2 \end{cases}$, then $f(0) = ...$

(a) 1 (b) -4 (c) 2 (d) 0

(20) If $4x + 9 \le f(x) \le x^2 - 2x + 17$; then $\lim_{x \to 2} f(x) =$

(A) 1 (B) -17 (C) 17 (D) 2

(21) An equation of the line passing through $(-1, 2)$ and $(2, -7)$ is

(A) $3x + y = -1$ (B) $-3x + y = -1$

(C) $3x + y = 1$ (D) $y - 3x = 1$

(22) If $y = \sin^2 5x$, then $y' =$

(A) $10\cos 5x$ (B) $10\sin 5x$ (C) $10\sin 5x \cos 5x$ (D) $5\cos 4x$

(23) If $\cos\theta = \frac{3}{4}$, $0 \le \theta \le \frac{\pi}{2}$, then $\tan\theta =$

(A) $\frac{5}{3}$ (B) $\frac{\sqrt{7}}{4}$

(C) $-\frac{5}{3}$ (D) $\frac{\sqrt{7}}{3}$

(24) $\lim_{x\to\infty} \frac{x^2+1}{x^2-1} =$

(A) ∞ (B) $-\infty$ (C) 1 (D) -1

(25) The inverse function of $f(x) = \ln(x)$ is

(A) $f^{-1}(x) = e^x$ (B) $f^{-1}(x) = e^x - 1$

(C) $f^{-1}(x) = e^x + 15$ (D) $f^{-1}(x) = e^x - 15$

(26) $\lim_{x\to 0} \frac{(x+3)^2 - 9}{x} =$

(A) -9 (B) 3 (C) 9 (D) 6

(27) The solution for the inequality $|5x-2| \geq 6$ is

(A) $(\frac{-4}{5}, \frac{8}{5})$ (B) $(-\infty, \frac{-4}{5}] \cup [\frac{8}{5}, \infty)$

(C) $[\frac{-4}{5}, \frac{8}{5}]$ (D) $(-\infty, \frac{-4}{5}] \cap [\frac{8}{5}, \infty)$

(28) The critical numbers of the function $f(x) = 2x^3 - 3x^2 - 12x$ are

A) -1,2 B) 1,-2 C) 1,2 D) -1,-2

(29) The function $f(x) = 2x^3 - 3x^2 - 12x$ is increasing on the interval

A) $(-\infty, -1) \cup (2, \infty)$ B) $(-\infty, 1) \cup (-2, \infty)$

C) $(-\infty, -1) \cup (-2, \infty)$ D) $(-\infty, 1) \cup (2, \infty)$

(30) The function $f(x) = 2x^3 - 3x^2 - 12x$ is decreasing on the interval

A) $(1, -2)$ B) $(1, 2)$ C) $(-1, -2)$ D) $(-1, 2)$

(31) The function $f(x) = 2x^3 - 3x^2 - 12x$ has a local maximum at

$x =$

A) 1 B) -1 C) 4 D) -4

(32) The function $f(x) = 2x^3 - 3x^2 - 12x$ has a local minimum at

$x =$

A) 3 B) -3 C) 2 D) -2

(33) The graph of $f(x) = 2x^3 - 3x^2 - 12x$ concave up on the interval

A) $(-0.5, \infty)$ B) $(-\infty, 0.5)$

C) $(-\infty, -0.5)$ D) $(0.5, \infty)$

(34) The graph of $f(x) = 2x^3 - 3x^2 - 12x$ concave down on the interval

A) $(-0.5, \infty)$ B) $(-\infty, 0.5)$

C) $(-\infty, -0.5)$ D) $(0.5, \infty)$

(35) The graph of $f(x) = 2x^3 - 3x^2 - 12x$ has an inflection point at

$x =$

A) -0.5 B) 0.25 C) -0.25 D) 0.5

(36) The graph of $y = x^5$ is shifted up 4 units and right 3 units, the equation for the new graph is:

(A) $y = (x-4)^5 + 3$ (B) $y = (x-3)^5 - 4$ (C) $y = (x-3)^5 + 4$ (D) $y = (x+3)^5 + 4$

(37) The function $f(x) = \begin{cases} \frac{x^2-4}{x-2} & x \neq 2 \\ 3 & x = 2 \end{cases}$, is continuous:

A) True B) False

(38) The derivative of $f(x) = \pi$ with respect to x is 1

A) True . B) False.

(39) $\lim_{x \to 0} e^x =$

A) 0 B) 1 C) does not exist. D) 123

(40) The horizontal asymptote of $f(x) = \frac{x}{x+1}$ is:

(A) $y = 1$ (B) $y = 2$ (C) $y = -1$ (D) $y = -2$